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[COMMON SECOND LEVEL FRAME EXPOSURE FOR EMBEDDED ATTENUATED PHASE SHIFT MASKS]

Abstract

A method of making an embedded attenuated phase shift mask (EAPSM) comprises initially providing a phase shift mask substrate having a layer of phase shifting material and a layer of an opaque material, and depositing a first resist layer on the substrate. The first resist layer is exposed by a direct write electron beam or laser energy source and developed, and the substrate is etched, to create first level phase shifting image segments on the substrate corresponding to areas of critical structures to be exposed with the EAPSM. The method then includes depositing a second resist layer on the substrate. Using a single frame exposure mask corresponding to non-critical areas outside the critical structure areas, the second resist layer is then exposed by simultaneous projection exposure. The method then includes developing the second resist layer and etching the substrate to remove the opaque material from the critical structure areas.